

**The DRC "Industrial Support Unit"**  
**Ramallah, Palestine**

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An Evaluation of IDRC Project # 96-8601  
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**INTRODUCTION**

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**Terms of Reference**

IDRC Project 96 -8601, "Industrial Support Unit, Palestine" provided support to a non-governmental body, the Development Resource Centre, to carry out activities with the following objectives:

**General Objective**

To improve the productivity and competitiveness of SMEs in Palestine.

**Specific Objectives**

- To allow DRC to set up an office in the West Bank to provide SMEs with affordable technical advisory and training services;
- To assist DRC in establishing an Industrial Support Unit in the West bank which will act as a DRC-lead consortium of existing institutions providing SMEs with technical, management, market and financial services in view of enhancing their productivity, competitiveness and potential for employment and income generation;
- To promote an integrated and holistic pro-active approach to service provision to SMEs in view of improving the effectiveness of services provided by the Unit's member institutions and enhancing their impacts and to substantially increase the number of SMEs benefitting from these services;
- To enhance the access of the Unit's member institutions and their client SMEs to international information related to new technologies, raw materials, export markets, government regulations, quality standards, etc....
- To get a better understanding of the constraints and needs of Palestinian SMEs and to provide decision-makers with recommendations for the formulation of policies and programs in support of the SME sector.

In addition to specifying these objectives, the Project Summary enumerated the following set of expected outputs from the project;

- To provide full feasibility studies and business plans to new investors and manufacturers seeking to upgrade their enterprises;
- To develop and implement training programs targeting the needs of industry on the ground and encouraging non-traditional work areas for women;
- To provide technical assistance packages to specific SMEs across all major sectors requiring help in specific areas of manufacturing and technology transfer;
- To provide environmental impact assessments and promote environmentally sound investment and manufacturing support;
- A series of sub-sector studies identifying constraints, needs and priorities of the main SME subsectors in the West Bank;
- A study on the policy, regulatory and institutional environment constraining the development

- of SMEs in Palestine;
- A critical assessment of the existing research and development (R&D) infrastructure and resources for SME support and development in Palestine.
- Based on the experience of this pilot project, provide recommendations to Palestinian policy makers and the donor community on alternative mechanisms and institutional arrangements for establishing a nation-wide industrial outreach system.

The specific terms of reference of the present evaluation are as follows:

- 1 The consultant will evaluate the project (relating to the DRC Industrial Support Unit) in close consultation with the Unit's Director and the steering committee. The objective of the evaluation will be twofold. First, the evaluation will assess the effectiveness of the Unit in achieving its stated objectives, and carry out a preliminary assessment of the impact of the project on SMEs in the West Bank. Second, the evaluation will analyse the experience of the Pilot Project in view of providing recommendations to policy makers and the donor community on alternative mechanisms and institutional arrangements for establishing a nation-wide industrial outreach system in Palestine.
- 2 In summary, the consultant is required to meet with DRC and ISU staff and its steering committee, with relevant government officials, and with representatives of 2 or 3 client firms. He is to provide a report which will include:
  - a situation assessment of the ISU results to date;
  - a discussion of "lessons learned" from ISU experiences in the light of experiences with similar support programs elsewhere in the world; and
  - a set of recommendations to the DRC and IDRC regarding future actions, both regarding this specific project and longer term actions to improve the industrial outreach system in Palestine

### **.Methodology**

This brief evaluation involved an intensive series of interviews with individuals and organizations listed in Appendix I, carried out in Ramallah on July 8 and 9, 1999 coupled with a review of documentation provided by both IDRC and DRC - the documentation is listed in Appendix II.

During the period of field work, it became quickly evident that the evaluation needed to give full weight to the impact on the DRC/ISU project of the particular political and economic circumstances which affect Palestine today, including the burden of the thirty years of Israeli Occupation and also including the present state of involvement of both the Palestinian National Authority and the Donor Community with private sector development. As a result, the evaluation has also used material collected during a preliminary analysis of Palestine's "National System of Innovation" carried out by Mullin Consulting Ltd for other clients during the period of July 11 to 17.

### **The Structure of the Report**

The report is presented in four major sections.

The *first section* deals with the environment for small enterprise development in Palestine and touches on the characteristics of the firms being considered, the activities of the Palestine National Authority and of Donor Agencies

in support of those firms and sketches out briefly some of the service providers active in the area

The *second section* deals with the first main element of the evaluation - the assessment of the performance, output and impact of the Industrial Support Unit operated by the DRC. This section offers also a commentary on the design of the project under evaluation.

The *third section* turns to the broader issue raised in the evaluation - that of the steps needed to be taken in the longer term to create a nation-wide industrial outreach system in Palestine.

The *fourth and final section* discusses some options open to IDRC in its future activities relating to SMEs in Palestine.

## **THE ENVIRONMENT FOR SME DEVELOPMENT IN PALESTINE**

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### **The needs and characteristics of SMEs in Palestine**

In order to appropriately assess the work of DRC and its ISU, it is crucial to begin with an understanding of the needs and characteristics of the firms which ISU is attempting to help.

Careful consideration of the overall performance of SMEs in almost all economies can lead to the conclusion that their most pressing and continuing needs can be summarised under five broad headings. These are the needs to obtain access to:

- ☐ Finance of all kinds, including finance for activities related to the promotion of technical change;
- ☐ Markets and market information;
- ☐ Improved management skills and systems, including those necessary for the management of technical change;
- ☐ Improved training for all of their employees, in particular to allow them to keep up with changing demands in the market place (specially for improved quality and service) and changing practices and technologies in the workplace; and
- ☐ Best practice technologies, where 'best practice' is defined in terms of the acquiring enterprise's capacity to absorb and manage the technology in question.

This set of needs can be used to provide a 'demand-side' framework for consideration of any program of support. Technology diffusion or extension programs need to address, in one way or another, each of these broadly defined needs, and need to do so in the context of the evolving rules of international trade as established by the World Trade Organisation.

Recent work in a Latin American country<sup>1</sup> categorised the predominant attitudes and approaches of SMEs in terms which are probably generally applicable in many countries. The attitudes were:

1. Lack of tradition in developing and/or continuously improving products and processes
2. Lack of understanding of management needs, especially relating to the management of technical change
3. Chronic shortage of funding (long-term financing and short-term cash flow)
4. Lack of ability to cope with the impact of the opening up of the domestic market to freer forms of trade
5. Lack of understanding of the opportunities that freer trade presents
6. Lack of understanding of technological needs in an open market
7. Absence of any tradition of seeking advice
8. A lack of trust in Government Programs
9. Lack of tradition of working together

Observations in Palestine lead to the conclusion that the above list is generally applicable with one important

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<sup>1</sup> See Mullin Consulting Ltd et al *Technology Development, Diffusion and Extension Services in Colombia* - A Report to the Department of National Planning of the Government of Colombia, sponsored by the Government of Japan, the World Bank and UNDP., November 1996

adjustment and one addition.

- Item 3, concerning a *chronic lack of funding* does not appear to apply in many cases but what does apply is an acute distrust of the Banking System by the owners of many SMEs. Many (probably the vast majority, according to all of those interviewed) family-owned SMEs will use only their own funds to develop their business
- the additional item relates to the great reluctance of many family-owned businesses to provide training of any kind to their employees. In the case of sectors where capital requirements for entry may be low (such as in furniture making) it is reported that employers fear that a better trained employee will set up a competing enterprise<sup>2</sup>. In more capital-intensive sectors the fear is that of losing the employee to a competitor.

As will be discussed more fully later, programs to help SMEs need to overcome the multiple problems contained in this listing of characteristics while linking SMEs to sources of help for their various needs. It is from this nexus of problems and needs that the requirement for a brokerage function emerges.

### **The Palestine National Authority and support for SMEs**

During two long discussions with the Minister of Industry and his senior staff - once arranged by DRC and once during interviews for another client, - it became clear that the focus of attention of the Ministry is currently two-fold - regulating existing enterprises and attracting new direct foreign investment into a planned series of industrial parks, including one designated for high-technology industry. There was little or no interest in the problems of SMEs.

In part, this needs to be understood against the backdrop of the severe financial constraints being faced by the Palestine National Authority which appears to be very heavily dependent on foreign donor finance. All of the significant projects of which I heard during my ten days in Palestine had significant donor support. As a consequence, if the Minister of Industry was to become convinced that there was a real need to develop support systems to improve the technological performance of SMEs, he would have to find a willing donor to finance the activity.

One added complication in the life of DRC is the suspicion of NGOs which is prevalent among members of the PNA, up to and including Chairman Arafat. Pending legislation could require NGOs to be registered by the Ministry of the Interior - an assignment of responsibility which is being opposed by NGOs.

### **Donor Agency Activity in support of SMEs**

#### *5. The European Union and its member countries*

The two principal EU programs directly addressing the technological needs of SMEs in Palestine are the program of the Centre for Private Sector Development <sup>3</sup>(CPED) and the European Information Correspondence Centre (managed by DRC)

CPED was established to undertake sector surveys and individual company diagnostics and then to provide a significant subsidy to projects responding to identified needs. It is one of six such bodies in the Middle East and

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<sup>2</sup> This observation is recorded in the DRC sector survey for the furniture industry

<sup>3</sup> The CPED is an EU unit, supported by DG I and DG XIII of the EU, and located in Ramallah

was conceived in anticipation of coming freer trade between Europe and the region at large. The CPED in Palestine started in 1996 as an eighteen month venture which has been once extended to a projected termination date next month! It has had internal problems with Brussels which has allowed CPED only to disburse a limited amount of funding, and none for new projects in the last several months. CPED worked through local consulting houses and NGOs, including DRC which it 'valued highly'.

The European Information Correspondence Centre (managed by DRC), a member of an extensive network of 270 such centres in Europe, the states of the former Soviet Union and the Middle East provides access to EU data bases on subjects such as availability of technologies or specific equipment and information on firms seeking partnerships of all kinds. It is financed by the EU and the services of all EICCs are provided free of charge to all users in the EU, in the states of the former Soviet Union and in the Middle East.

*An SME support project supported by the Government of Italy and administered by the ILO.*

There is a project now in operation which describes its objectives as being

"to provide non-financial support services to artisan and small scale enterprises strengthening particularly the sub-sectors of marble and stone, leather and shoes, garment and textile through the establishment of four Small Enterprises Development Units (SEDUs) at the four selected chambers of commerce industry and agriculture (CCIA) in Hebron, Nablus, Bethlehem and Gaza and Management Unit (MU) at the Federation of Palestinian Chambers of Commerce Industry and Agriculture (FPCCIA). The SEDUs are intended to provide a wide range of highly practical, demand driven services to small-scale enterprises in the selected chamber respective area. The type of the services to be provided by the SEDUs include consultancy services to help small businesses to overcome a range of common practical problems related to business planning, marketing, productivity and quality, highly practical training programmes, facilitation of linkages between small businesses in the same sub-sectors, between such group and overseas sectoral associations and between individual local and overseas enterprises, referral services to help SMEs identify other support schemes, information services and facilitation of access to credit sources and services."

Discussion with the Federation of Palestinian Chambers of Commerce, the recipient organization, indicated that while the project was having a positive impact in strengthening the four participating chambers of commerce, its impact on SMEs was 'difficult to assess' and that there had been no business linkages created between Palestinian and Italian firms.

#### *European Financed Training Activities*

A variety of European countries, including the UK, Germany, Italy, Sweden and Holland, all support business-related training courses, most of which are delivered with the help of local organizations such as DRC.

#### *European Donor Coordination*

According to an official, there is no attempt made to coordinate the activities of the EU with those of the member countries of the EU in the provision of services to SMEs.

## 2 US AID Programs

The biggest and newest US AID project relating to business development is a project designed to strengthen the operations of Industrial Sectoral Associations - primarily in manufacturing - and to assist in the development of a federation of those associations (in parallel to the development of the Federation of Chambers of Commerce and its constituent Chambers)



No information was gathered on the US AID Small Business Support Program other than a reference to its having used DRC Gaza to offer some training courses. The people in the DRC Ramallah office did not know any of the details and the interview with the Director of the Gaza office was

#### *General Donor Coordination*

Donor coordination was described as being no more than informal exchanges of information.

The limited time allowed for the evaluation did not permit further probing of other donor activities, and in particular no information was gathered on a World Bank project dealing with the development of micro-credit.

#### **Palestinian Organizations providing services to SMEs**

It appears to be fair to say that there are few organizations now operating in Palestine with a capacity to provide help to SMEs, that they are not well known to firms and that they face difficulties because individual SMEs do not believe that there are sources of potential help in Palestine. (One observer commented that Palestinian SMEs prefer to seek foreign help and even then, often do not implement the advice given.)

Some of the universities identified in the Project Summary (Bir Zeit, Al Najah and Hebron) as well as the Islamic University of Gaza do have capacities to provide testing services and some are seeking accreditation from the fledgling Palestinian Standards Organization. In addition two technical colleges - the Palestine Polytechnic Institute in Hebron and The Palestinian Technical College in Gaza are attempting to gear their services directly to local enterprise needs.

The area of skills upgrading is currently being addressed by the Palestine National Authority which in recent days has prepared a new Strategy for Vocational Education. The strategy has been approved by the three Ministers involved (Higher Education, Education and Training, and Labour) and will now go to the Legislative Assembly. Included in the Strategy are provisions for a (potentially controversial) tax to be levied on employers to finance the scheme.

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## THE PERFORMANCE OF DRC'S INDUSTRIAL SUPPORT UNIT

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### The Present Status of DRC

At the time of the field work for this evaluation, DRC was in considerable financial difficulty due to a conjunction of events. As an NGO, it has been dependent on donor support, via contracts, for the funds required to finance its operations as well as for funding of the services it delivers. From the information obtained during interviews, it appears that DRC depended on three principal sources of income to cover its operating costs, including staff salaries. These were:

- 1 An annual contract, for about 160,000 Euros from the European Union, for the operation of the Palestinian member of the network of "European Information Correspondence Centres" (EICC);
- 2 Contract fees from the EU Centre for Private Enterprise Development (CPED) for the conduct of diagnostic studies and the provision of advice to individual enterprises (such activities were financed on a 75:25 basis, with CPED contributing 75% of the funds and the target firm paying the remaining 25%); and
- 3 the IDRC ISU project, now in its third year.

Additional funds to run specific training courses or to bring specific foreign consultants to Palestine have been obtained on an ad hoc basis from a variety of bilateral donors.

At the present time

- DRC has been without a contract or funding for the EICC operation for about eleven months, despite having been evaluated as the most effective EICC in the Middle East. Bureaucratic delays and shifting rules in Brussels have meant no contract despite agreement that the work should go on. DRC has continued to provide EICC services free of charge to its clients (which is the norm for EICC services in Europe and the Middle East) while having no revenue stream to support the activity
- The CPED was instructed by Brussels, almost a year ago, to cease approval of new activities pending decisions on the future of the program. At that time it had approved sectoral diagnoses of about 160 firms, and perhaps about 20 follow-up firm diagnoses, some of them executed by DRC, but had not yet been permitted by Brussels to use any of its resources for implementation of the results of the diagnoses. CPED's own future is in doubt since its mandate expires at the end of August of this year with no decision yet on whether its life will be extended, or whether the program and resources will be transferred to another EU-supported body (likely the Palestine Development Fund) or whether the program will simply cease to exist.
- the IDRC project is in its final year and is scheduled to provide only limited resources, based on the (unfounded) expectation that DRC would by now be generating significant private sector income.

As a result, total DRC staff is now down to eight (four in Ramallah, three in Gaza and one currently in New York) from a high of seventeen. Most of those who received training in company diagnostics in year one of the project have now gone.

The Ramallah office has seen four directors during the lifetime of the IDRC project and one of its current staff members is a British consultant in international marketing who spends up to one third of his time in Palestine.

The current director of the Ramallah office was on home leave in the UK during the period of the field work for this

evaluation.

An attempt was made to collect data on DRC's activities during the life of IDRC support and accordingly, on Saturday July 10, copies of three tables were given to staff of the Ramallah Office with the request that they be completed for both the Ramallah and Gaza Offices, either separately or jointly. The tables in question were:

#### Data on Training Courses

Type of Course	1997		1998		1999 to date	
	# of courses	# of participants	# of courses	# of participants	# of courses	# of participants
Management						
Financial						
Marketing						
Technical						
Other						

#### Company Diagnoses and provision of specific advice (numbers of diagnoses)

Sector of Activity	1997	1998	1999 to data
Packaging			
Handicrafts			
Furniture			
Leather Goods			
Information Technology			
Garments			
Food and Beverages			
Pharmaceuticals			
Other sectors			

**Requests for information from EICC (numbers of requests)**

Type of information	1997	1998	1999 to data
Availability of machinery			
Availability of technology			
Trade Fairs			
Regulations in other countries			
Search for partners			
Other information			

As of the date of writing this report, (July 20 ) no input has been received from DRC.

**A Comment on Project Design**

In reviewing the project summary, there appear certain features which, to this evaluator, appear to be unrealistically optimistic and some that do not appear to be based on experience in technology extension systems in operation around the world.

The primary problems occur in the financing expectations where assumptions are made about the likely revenues to be generated from private sector users of DRC services. These problems include:

- ☐ the failure to indicate that among all of the technology extension systems now operating to help SMEs, including those in Canada and the US, there is only one case (in one of the German Lander) in which SMEs make any contribution to the costs of the initial diagnostic and brokerage services provided by the extension system. As it turned out, almost all of the work undertaken by DRC lay in the company or sectoral diagnostic area or in attempting to broker linkages between an SME and a supplier of services.
- ☐ the failure to discuss how Palestinian SMEs were going to be persuaded to seek and pay for services, particularly technological services, without some subsidy. In practice, the SMEs who did become involved with DRC in the main came via the European Union's CPED Program which managed to spend funds for some diagnostic activities but which was suspended by Brussels before any of its client firms received any support for services to assist in tackling specific problems. (Evidence from the highly limited set of interviews suggests that one firm has made modest investments of its own funds in improving its marketing approach while another rejected the technical advice of a DRC consultant [supplied by CPED] and went on to make a significant investment in new machinery which was much less expensive than that recommended by the consultant.)
- ☐ the failure to discuss the overall financing of DRC which is an NGO. In fact, DRC was almost entirely dependent on the three sources indicated in the previous section of this report, viz

- 1 Revenues from the European Union for the operation of the EICC, which have dried up completely over the last twelve months due to bureaucratic wrangling in Brussels over the form and content of a new contract (while there is no dispute with the desirability of that new contract);
- 2 Revenues from diagnostic and brokerage work done under contract to CPED - a source of funds now suspended and which could be eliminated as early as August 1999; and
- 3 the IDRC project which was providing funding on a sharply declining scale over its three year life.

Speculation among some DRC staff suggests that DRC is still operational due to the Executive Director using his personal resources to bridge the serious gap in financing.

### The Effectiveness and Impact of the ISU's Activities

Against this backdrop of difficult circumstances, the specific objectives of the IDRC-supported ISU project, and the projects expected outputs were reviewed. The results are presented below.

**Table 1: Commentary on the project's Specific Objectives.**

Specific Project Objective	Observation from Field Work
To allow DRC to set up an office in the West Bank to provide SMEs with affordable technical advisory and training services;	<p>An office has been established in Ramallah and continues to be open, despite severe financial problems. The advisory services provided to SMEs from this office appear, increasingly, to relate to marketing, both domestic and international.</p> <p>There is little evidence that SMEs are prepared to pay more than 20 - 25% of the cost of activities which then need to be subsidised by a donor agency - in most cases the EU's CPED which may now disappear in the next few weeks.</p>
To assist DRC in establishing an Industrial Support Unit in the West bank which will act as a DRC-lead consortium of existing institutions providing SMEs with technical, management, market and financial services in view of enhancing their productivity, competitiveness and potential for employment and income generation;	The idea of the consortium presented in the project was misconceived. It failed to distinguish between brokerage and service functions which require two different kinds of funding, neither of which are readily available in Palestine.
To promote an integrated and holistic pro-active approach to service provision to SMEs in view of improving the effectiveness of services provided by the Unit's member institutions and enhancing their impacts and to substantially increase the number of SMEs benefitting from these services;	The consortium fell apart quite quickly when other members discovered that DRC did not have funds to finance their activities. The total number of SMEs benefitting from the services on offer by DRC appears to have fallen far short of the 200 set as a target in the Project Summary. DRC has not yet provided the data to clarify this point.

Specific Project Objective	Observation from Field Work
To enhance the access of the Unit's member institutions and their client SMEs to international information related to new technologies, raw materials, export markets, government regulations, quality standards, etc....	The most successful element of DRC's program appears to have been its management, through its Gaza office, of the EU-funded EICC. According to information provided by CPED, it was evaluated as the strongest EICC in the Middle East. It has been a very significant achievement for DRC to maintain this service during the almost twelve months for which it has received no budget from the EU for its efforts.
To get a better understanding of the constraints and needs of Palestinian SMEs and to provide decision-makers with recommendations for the formulation of policies and programs in support of the SME sector.	While DRC staff may have developed a better understanding of SME constraints and needs, no evidence was provided to this Evaluation to suggest that this understanding was at any time converted into a coherent set of policy recommendations.

Table 2: Commentary on the Project's Expected Outputs

Expected Output	Observations from Field Work
To provide full feasibility studies and business plans to new investors and manufacturers seeking to upgrade their enterprises;	Such work was done in conjunction with CPED. Given the lack of DRC data on how many firms were assisted, it appears that CPED had only financed such activities for about twenty firms and that this work was shared between DRC and a private consulting firm. This would put the upper limit on DRC-assisted firms at 19 or less.
To develop and implement training programs targeting the needs of industry on the ground and encouraging non-traditional work areas for women;	DRC appears to have been active, especially in Gaza, in providing both management and technical training (with the technical training said to be more popular.) There has been limited interest in gender questions - DRC Gaza offered one course to women on entrepreneurship, described as 'a simplified version of a course given to men'.
To provide technical assistance packages to specific SMEs across all major sectors requiring help in specific areas of manufacturing and technology transfer;	This has been limited, in most cases, to identifying available technical packages via the EICC. In one case identified during the evaluation where a consultant obtained from CPED was used, the technical advice given to the firm involved was faulty (inadequate consideration to cost factors)
To provide environmental impact assessments and promote environmentally sound investment and manufacturing support;	No systematic provision of such advice except in cases where EICC services were used to locate a foreign technology or piece of equipment in which case information on the environmental performance of the technology or equipment was sought.

Expected Output	Observations from Field Work
A series of sub-sector studies identifying constraints, needs and priorities of the main SME subsectors in the West Bank:	<p>A series of studies has been carried out or is in process for the sectors of Packaging, Handicrafts, Furniture, Leather Goods, Information Technology, Garments, Food and Beverages and Pharmaceuticals. These appear to have been primarily designed to provide CPED and DRC with diagnostic information on individual firms considered suitable to receive further support from CPED, delivered via DRC. Their utility with respect to sectoral planning or analysis is limited due to the almost complete absence of aggregate data - a problem in Palestine.</p> <p>From reading of two of the reports on sector surveys, it appeared that the authors made no use of the kind of diagnostic tool available in other countries and which had been developed in IDRC projects in South East Asia. Of particular relevance would have been the Singapore experience in using data collected by the diagnostic tool for the purpose of identifying widely occurring problems in particular industrial sectors.<sup>4</sup></p>
A study on the policy, regulatory and institutional environment constraining the development of SMEs in Palestine;	Not undertaken by DRC
A critical assessment of the existing research and development (R&D) infrastructure and resources for SME support and development in Palestine.	Not undertaken by DRC. DRC staff interviewed appeared to have limited knowledge of any technical activities of the Palestinian Universities and did not appear to see the universities as potential sources of assistance.
Based on the experience of this pilot project, provide recommendations to Palestinian policy makers and the donor community on alternative mechanisms and institutional arrangements for establishing a nation-wide industrial outreach system.	While individual members of DRC staff may offer individual pieces of advice to PNA and donor community officials, there is no evidence to suggest that DRC ever considered itself to be in a position to give overall advice on means to establish a national industrial outreach system.

While the hard reality of the project is that circumstances have conspired to prevent DRC and its ISU having any measurable impact on SMEs in Palestine, the organization has developed a positive reputation in the eyes of officials and donors for its dedication to the difficult task.

From the limited evidence collected in Ramallah, it appears that the ISU is focussing on assisting SMEs to improve their marketing and, in one case of a pharmaceutical company, is engaged in attempting to develop a market for the company's veterinary products in a North African country, with remuneration for the activity being

<sup>4</sup> See "Technology Adoption by Small and Medium-sized Enterprises in Singapore"  
SRC Publication No. I-4603-1-C-92 of May, 1992

on a contingency basis - if no market develops, DRC (or Egerton Mercantile, the company owned by an ISU part-time consultant?) will receive no fees.

No measures exist to demonstrate that, to date, the ISU has had a direct impact on either the productivity or competitiveness of any SMEs in Palestine. Neither was the sample of interviews wide enough to identify 'success stories' nor did DRC offer any specific cases where an effect could be demonstrated.

#### **Lessons learned from the Pilot Experiment**

- ❑ The DRC experience has yet again demonstrated that there is a need for a continuing extension service to interact with SMEs to encourage them to change their ways of operation in order to compete against the rising forces of competition in increasingly open markets. It has also demonstrated again that SMEs will not pay for initial diagnostic and advisory services - at best SMEs will invest in solutions to their problems once they have been identified.

This confirms world-wide experience to the effect that primary extension services - such as initial diagnoses of SME performance - need to be financed on a continuing basis by the State. In the case in which the State is unable to provide such finance, Donor assistance needs to be put in place with some medium-term commitment to continuity.

- ❑ Once a basic 'brokerage service' is in place, decisions need to be made on what level of support is to be provided to subsidise the cost of services which will be used to meet the needs of the SMEs identified by the initial diagnostic help provided. (In Canada, 75% of the IRAP budget is used to make financial contributions to firms to help them respond to either needs or opportunities and these funds are additional to other government tax incentives or direct contributions to technology development activities. The DRC/ISU project was operating in an environment in which the only support expected for such activities disappeared before ever becoming operational.
- ❑ Support to NGOs needs to be premised on a full understanding of the financial resources needed and available to support the organisation in the long term, and a clear view of the role of each individual source in assuring the viability of the NGO.
- ❑ The cost of providing support to SMEs of the kinds contemplated in the ISU project is significant, even in small countries. In places where continuing support from government is not likely, at least in the medium term, there needs to be sufficient donor coordination and commitment to make the venture viable. This was not the case in Palestine in recent years.



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## A NATION-WIDE INDUSTRIAL OUTREACH SYSTEM FOR PALESTINE?

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This section of the report will consider experience in other parts of the world which might provide insight into how a national industrial outreach system might be designed for Palestine.

### Experience in other countries with technology extension systems<sup>5</sup>

#### *Background*

The nineteen nineties have been a period during which much international discussion of economic policy and economic relations has been dominated by two words:- 'globalization' and 'competitiveness'. For many countries, this heavily private-sector-oriented approach comes fast on the heels of the World Bank and IMF - sponsored processes of structural adjustment. Very significant pressures are now being exercised on those countries to open markets to foreign competition and to down-size the role of the state as a direct economic actor. With today's emphasis on increasing roles for private sector actors, it can be argued that there is both a pressing need and a real opportunity for Governments to take a fresh look at the role of S&T programs and policies in their countries, to see if they can better align their available resources to the new international context. And all of this has occurred in a period which began with OECD Ministers acknowledging technical change as a primary source of economic growth.

The perception that technical change is the primary source of economic growth means that economic and S&T policies have to recognize as central concerns the two processes - innovation and technology diffusion - which are the agents driving that technical change.

The rate of technical change in a country depends not only on the amount of R&D done in the country, but also on important factors such as the ways in which available resources (including skills) are organized at both the national and at the agency or firm level, and on the availability of technologies from both domestic and foreign sources. It is within this context that technology diffusion is a highly important concept and so the promotion of the effective distribution of available knowledge is a critical function of a "national system of innovation". A well-functioning process of technology diffusion can allow countries to make improved progress through appropriate combinations of domestic and imported technologies, but this in turn will be highly dependent on the 'receptor capacity' of local firms and institutions.

According to the Organization for Economic Cooperation and Development, OECD<sup>6</sup>

*"Technology diffusion is not just a simple one-way flow from emitter to receptor, but has its roots in national innovation systems. It is a complex process involving the interaction of a variety of users and*

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<sup>5</sup> This section of the present document is based on a longer paper on "Technology Extension Systems" presented by the author at a Seminar on BEST PRACTICES IN MANAGING POLICY INSTRUMENTS FOR TECHNOLOGY EXTENSION INSTITUTIONS held in Santiago, Chile and organized by the Chilean Economic Development Agency, CORFO and the Technological Research Corporation, INTEC, October, 1998

<sup>6</sup> See, "Diffusing Technology to Industry: Government Policies and Programmes", OECD/GD(97)60, OECD, Paris, 1997, page 18

*organizations, each with different roles: suppliers, producers, adopters, non-adopters, third parties and information networks. Technology can diffuse in multiple ways and with significant variations, across time, over space and between different industries and enterprise types, depending on the particular product or process. Technology may be acquired from a variety of sources, including private vendors, customers, consultants and other firms, as well as public technology centres, government laboratories and universities. Technology also diffuses through internal "catch-up" efforts of firms, the transfer and mobility of personnel, the activities of professional societies, the trade and scientific press, varied forms of informal knowledge trading and practices such as reverse engineering.*

*Government technology diffusion policies should not seek to create entirely new structures and pathways, but to improve the diffusion performance of existing national innovation systems.....Successful technology diffusion will address gaps and opportunities in relationships, attitudes, structures and practices at multiple levels - the "micro" level of the firm, the "meso" level of networks and the "macro" level of broad technology policy."*

There is now much interest in redefining the role of the state, and of state-supported institutions, in the promotion of technology diffusion and acknowledgment of the need to pay particular attention to the complex issues surrounding the diffusion of technology among small and medium scale enterprises (SMEs). Governments can try a variety of policy instruments in order to promote technology diffusion such as advisory services, technology service institutions, financial incentives, grants or loans, or specially-tailored training programs for either firm managers or employees. Several governments in various parts of the world are attempting to evaluate how a "technology extension system" might be constructed in order to optimize the use of a variety of instruments in pursuit of improved diffusion.

For the purposes of this paper, we will define a technology extension system as

*"a set of functioning institutions, organizations and policies which interact constructively to promote and facilitate the diffusion of technology within a national economy in order to improve the competitiveness of firms within that economy."*

An additional complicating factor in the design of a "technology" extension system is the need to impart a broad view of what "technology" means to a firm.

*"Technology has to do with certain kinds of knowledge which will allow the adaptation and application of means to ends. It is embodied in the brains of people, in organizational structures, and in behavioural patterns, which in turn are conditioned by the strategies of different social actors and their patterns of conflict and co-operation. Applied technology is therefore not simply sold or licensed. It is jointly embedded by its producer and the user into organizational production patterns and management structure. Secondly, technology diffusion, and technological change, do not occur in a vacuum. They are driven to a large degree by the fundamental requirements of competition"*<sup>7</sup>

*Experiences in dealing with small and medium scale enterprises*

While most governments of the industrialized world have programs to enhance the technological performance

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From Mytelka et al, "Canada-Latin America Technology Network: An International Network to Facilitate Strategic Partnerships", Report to FOCAL, Ottawa, 1993, p9

of their SME's, a common result is that the country's large companies often end up as the primary beneficiaries, given their better capacities to act as "technology receptors". For example, a study<sup>8</sup> of US Federal Laboratories, by the US General Accounting Office, showed that the 88 laboratories from 9 major departments and agencies surveyed were almost three times as likely to have transfer of technology agreements with large corporations than with "small" ones, while "small" companies (defined in the study as having 500 or fewer employees!) made up more than 98% of all US manufacturing enterprises.

At a meeting (in the mid-nineties) of Heads of National Research Institutions of the industrialized countries, most of which have explicit mandates to address the needs of small and medium-sized enterprises, there was a growing recognition that

- \* medium to large-sized companies with inherent competencies and staying power make better clients and partners; and
- \* "services" to industry and working for SME's are not enough to maintain a lab's own level of expertise. Partnerships with larger firms and continuing government support appear to be *sine qua non* conditions for a viable, progressive and effective public research organization.

While there are considerable successes to be seen in the operations of several industrial extension services, it needs to be acknowledged that these services work most efficiently and effectively when their clients have some measure of in-house technical competence. In Canada's case, for example, more than 75% of the clients of the IRAP system have some in-house R&D capacity, while less than one in three of all Canadian manufacturing SMEs fall into that category. A recent study<sup>9</sup> in New York State found that SMEs with well-developed internal technical skills exhibit above average spending on external help, which suggests that the market for the services of technology centres improves as the average level of internal technical competence among their potential clients increases. A recent World Bank Report<sup>10</sup> has reported on a study of some 167 "Technology Institutions" (TIs) designed to serve six industries of differing degrees of technological intensity<sup>11</sup> in eight different countries of different size and state of development<sup>12</sup> and has produced similar conclusions. This implies strongly that developing countries will need to go beyond the experience and practices of industrialized countries as they attempt to promote technical change in the vast majority of their enterprises and to strengthen the contribution of public or university-based technology centres in that process.

A typology of diffusion programs and services

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<sup>8</sup> US General Accounting Office, "DIFFUSING INNOVATIONS: Implementing the Technology Transfer Act of 1986" Doc No. GAO/PEMD-91-23 of May 1991

<sup>9</sup> MacPherson A., *The contribution of external service inputs to the product development efforts of small manufacturing firms* R&D Management, 1997, vol. 27, no. 2, pp. 127-144(18)

<sup>10</sup> World Bank Technical Paper No 383, "Technology Institutions and Policies: Their role in developing technological capability in industry" by Melvin Goldman and Henry Ergas, with Eric Ralph and Greg Felker, The World Bank, Washington DC, July 1997

<sup>11</sup> The six industrial sectors were foundries, textiles, auto parts, machine tools, software and polymers

<sup>12</sup> The countries were India, China, Taiwan, Korea, Japan, Hungary, Mexico and Canada.

There are many possible building blocks which can be assembled into a technology extension service. The Table below, based on one first published by OECD<sup>13</sup>, gives an overview of some of the more frequently found elements.

#### Typology of Technology Diffusion Programs

Goal	Program Type	Objectives
1 to improve the adoption and adaptation of specific technologies	Technology -specific	To diffuse a specific technology to a wide number of firms and sectors.
	Institution-specific	To promote technology transfer from specific institutions
	Sector -specific	To diffuse technology to a specific industrial sector
	Demonstration	To demonstrate the practical implementation of specific technologies
2 To improve the general technology receptor -capacity of firms	Technical Assistance	To provide external assistance to firms in diagnosing technology needs and in problem-solving
	Insertion of technically-trained staff	To introduce technically-qualified (usually young) people into firms, to create a capacity to work on technical change
	Information networks	Access to information on technology sources, etc
	Assistance for small-scale R&D Projects	Build capacity for in-house technology development
	Region-specific	To diffuse (usually a wide-range of ) technologies within a specific region
3 Build up the internal innovation capacity of firms	Sector-wide technology road-maps	Systematic planning for future strategic technology investments
	Diagnostic tools	Assist firms to develop innovation-oriented management (including promotion of organizational change)
	Benchmarking	Transmit best practices from elsewhere
	University-industry collaboration	Upgrade the knowledge base of the firm
4 To expand the technical capacity of a national economy to make it more competitive	Creation of networks of research centres	To expand the knowledge-generating capacity of an economy and to link that capacity directly to firms
	Creation of industrial R&D consortia	To have firms share the risks of pre-competitive research and share the knowledge obtained

The two important models of “technology extension systems” in operation today are

<sup>13</sup>

See OECD 1997, *op cit*, p8; added material is shaded

- 1 the 'brokerage model' in which the system is designed to interact with client firms in order to identify problems and then to identify a service capable of responding to that problem - in this model, the extension service itself offers advice, and may offer financing, but the main technological inputs come from other organizations such as technology institutes;
- 2 the 'technology centre model' in which technology centres - usually with specific sectoral and/ or regional mandates- actively offer a range of technology services to firms in need. (Even in this model, networking and brokerage are becoming important functions.)

Canada's IRAP program will be used as an example of the 'brokerage model' and the US Manufacturing Extension Program as an example of the 'technology centre model'.

#### *Canada's IRAP Model*

Canada has designed and implemented, over the last thirty years, a technology extension system - IRAP<sup>14</sup> - which actively seeks out potential clients among small and medium scale enterprises, engages in dialogue with firms to identify specific technological needs, and then deploys a series of policy instruments, under direct IRAP control, to tackle the problems identified. From its creation, IRAP has been designed to provide national coverage and to deal with all sectors of the manufacturing and resource industries.

IRAP is a field extension advisory service which functions as a network. Its field officers (about 250 in all and referred to as 'industrial technology advisers' or ITAs) are regionally located in every province and operate from about one hundred and ten cities and towns across Canada. About one third are employees of Provincial Research Organizations, and about forty percent are consulting engineers and specialists from universities, colleges, private sector technology centres or even industrial associations. (The organizations employing them are reimbursed by the national IRAP Program at a negotiated rate per person year, including travel costs plus a fixed rate of overhead to cover administrative support) The remainder are employees of the National Research Council of Canada which is responsible for program management. The service is provided free of charge to firms, and the specialists provide information, guidance and assistance to industry for increasing technological awareness, solving technical problems, encouraging the use of new technology and accessing of other government assistance programs.

An important function of the ITAs is to initiate contact with potential clients among Canada's small and medium scale enterprises since most such firms do not actively seek help.

The program includes a technical information service which assists small secondary industry to keep abreast of new developments in research and technology development and which is operated with the participation of NRC's Canada Institute for Scientific and Technical Information.

Among the policy instruments managed by IRAP and available to the field officers are

- a *company diagnostic kit*, designed to assist in the rapid appraisal of firm operations, needs and problems;
- a "*Technology Acquisition and Information Exchange*" package of initiatives designed to respond to the need for ITA's to support a variety of small scale initiatives. The intention of this element is to enable SME's to demonstrate and improve their technical competence as a basis for future, more substantive innovation,

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<sup>14</sup>

Information on IRAP is available on the World Wide Web at <http://www.irap.nrc.ca/irap/irap.html>

development and technology management. This element is designed to address Canada's shortage of highly skilled personnel through training and student assistance projects. Short term technical problem solving is supported primarily within the context of a strategy or plan for longer term technological development worked out between the SME and the ITA. Financial assistance is currently limited to \$15 000 per company with a maximum (future) limit of \$30 000.

There are two categories of projects financed within this aspect of IRAP's work - *Enterprise Projects* involve individual firms and proprietary benefits; *Industry Projects* seek to benefit an industry or sector and strengthen industry - wide capacities. There is an implicit attempt to move away from a previous "project by project" decision-making approach to one based on a program designed to bring about the progressive development, through a series of incremental changes, of a participating SME's technological capacity.

- *Research, Development and Adaptation Projects* involve financial and technical assistance, on a selective basis, for R&D projects up to and including prototype constructions, and for the transfer of existing technologies of proven technical merit to SMEs who intend to adapt them to improve their competitive position. The R&D emphasis is on advancing unproven technology to the point where it can be moved into performance testing and the various validation stages prior to commercialization.

Many SMEs' most urgent competitive needs involve financial assistance to offset the risks associated with the development of entirely new or substantially adapted technologies. This instrument will cover project assistance up to \$350,000, and will generally be distributed over more than one year. There are distinct levels of project assistance available which are linked to delegated decision-making which in turn permits rapid response by ITAs to many opportunities.

- *an international technology acquisition facility* - "The Technology Inflow Program" (TIP) -to facilitate the flow of foreign technology into Canada. TIP is designed to assist Canadian companies which cannot fund an extensive R&D effort of their own and are unfamiliar with foreign sources of technology. It pays for some of the initial costs (up to a maximum of \$Can 15,000.00) for seeking out technology collaborations or means of access to foreign technology.

TIP not only facilitates Canadian acquisition of foreign technology; it also helps to establish on-going relationships with foreign firms that will result in access to new markets and foreign investment. Such relationships can involve various forms of industrial and technological cooperation, including technology transfers, licensing agreements, joint ventures, as well as strategic alliances.

This particular program seeks to help companies access technology in two ways. First, it offers information and advice on foreign sources and forms of technology through its specialized advisory services. Second, it provides modest financial support to Canadian companies for certain eligible activities such as study visits overseas related to the acquisition of foreign technology.

With assistance from a Canadian Technology Centre - the Saskatchewan Research Council - and IDRC, technology extension systems based on the IRAP model have been developed in Malaysia, Thailand and Singapore<sup>15</sup>.

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<sup>15</sup> The relevant publications describing these developments are:

**"Technology Adoption by Small and Medium-sized Enterprises in Malaysia"**  
SRC Publication No. I-4501-2-E-88 of November 1988;

*The Case of the US Manufacturing Technology Centres*

The NIST Manufacturing Extension Partnership (MEP) is a US nationwide network of locally managed extension centers offering technical assistance and the latest business practices to help the nation's smaller manufacturers improve their competitiveness. At the heart of MEP is a network of more than 400 manufacturing extension centers and field offices located throughout the country. Started in 1989, today's network delivers services to manufacturers in all 50 states and Puerto Rico.

**MEP Extension Centers**

MEP centers are local resources serving their local markets. Linked together through NIST's MEP, they are part of a national network of manufacturing and business experts. They exist as the result of a partnership among the federal government, state/local governments, and industry to help local manufacturers. They are created through a competitive, merit-based process where funding is contingent upon successful annual reviews of each center. MEP centers are supported by contributions from public and private organizations that match federal funding.

While part of a national network, MEP centers are independent, non-profit organizations. They offer products and services that meet the specific needs of the region's local manufacturers. Each center works directly with area firms to provide expertise and services tailored to their most critical needs, which range from process improvements and worker training to business practices and applications of information technology. Solutions are offered through a combination of direct assistance from center staff and work with outside consultants. MEP centers are staffed by knowledgeable manufacturing engineers and business specialists who typically have years of practical experience gained from working on the manufacturing floor, managing plant operations, or both. MEP center staff also know the local business community and the available local resources and can access additional resources available through the MEP network. As a result, centers help small firms to overcome barriers in locating and obtaining private-sector resources.

MEP centers work with companies that are willing to invest in themselves. That means companies that are willing to invest time, money, and/or human resources to improve their businesses. Typical MEP clients include manufacturers who:

- have been unable to locate the proper resources or technologies they need;
- want expert, impartial advice in helping them evaluate alternative solutions;
- need help solving a specific problem, such as determining the cause of product defects, modifying plant layout to improve work flow, or establishing employee training;
- want assistance in reversing negative business situations--such as sales decreases, loss of market share, or cost increases;
- want to implement new technologies or processes that will help establish them as market leaders; or
- seek to improve their ongoing business operations for peak performance.

Some of the services provided include:

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**"Technology Adoption by Small and Medium-sized Enterprises in Thailand"**

SRC Publication No I-4501-2-C-89, 1989

**"Technology Adoption by Small and Medium-sized Enterprises in Singapore"**

SRC Publication No. I-4603-1-C-92 of May, 1992

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| <input type="checkbox"/> process improvement         | <input type="checkbox"/> human resource development | <input type="checkbox"/> energy audits           |
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| <input type="checkbox"/> business management systems | <input type="checkbox"/> market development         | <input type="checkbox"/> financial planning      |
|  | <input type="checkbox"/> materials engineering      | <input type="checkbox"/> CAD/CAM/CAE             |
|  | <input type="checkbox"/> plant layout               | <input type="checkbox"/> electronic commerce/EDI |
|  | <input type="checkbox"/> product development        |  |

### How Centers Help

**ASSESSMENTS** Many firms begin their relationship with an MEP center through an assessment of the company's current operations and opportunities for improvement. As part of that assessment, field engineers may review the manufacturing process, the plant layout, the inventory and materials flow, and the policies and procedures. Field engineers, also known as manufacturing specialists, then prepare an evaluation of the firm and its operations. These findings are reviewed with management and other key personnel at the manufacturing company.

As a result of the assessment, MEP manufacturing specialists may recommend a few simple, quick solutions or a detailed plan of action. Both types of recommendations are designed to provide quantifiable, bottom-line impact on performance--productivity, quality, profits, or sales.

For some firms, these assessments are enough to get started. The manufacturer may have the resources to implement the plan, or may incrementally pursue new initiatives or changes. For those manufacturers requiring assistance in implementing center-suggested actions, the MEP center can provide the solutions and the support.

**TECHNICAL AND BUSINESS SOLUTIONS** The degree and type of assistance provided to each MEP customer firm is based on the particular need of that manufacturer. For a firm dealing with employee relations and human resource issues, for example, support may come through a management training program, a series of staff workshops, or revamping relevant policies and procedures--all services managed by the center staff either independently or through other experts. If the field engineers identify inefficiencies in the physical layout of the plant, they may provide a number of options for reconfiguration and may guide the process for testing these alternatives. Other services may focus on quality improvement, new product development, new equipment needs, marketing and sales support, or capital investments.

**ACCESS TO RESOURCES** Sometimes, the technical guidance needed by a manufacturer is best found beyond the MEP center. That is when the value of MEP is most apparent. Through both its local and national network of partners, MEP staff can identify experts and resources from the region--or across the country--that can help improve a company's performance. In fact, the MEP network provides small manufacturers with access to over 2,000 partnerships with federal agencies, national associations, and other organizations. Projects with the U.S. Department of Labor, U.S. Department of Energy, U.S. Environmental Protection Agency, U.S. Department of Defense, federal labs, and manufacturing associations are examples of how MEP leverages public and private resources to make a comprehensive range of technical services and assistance available to small manufacturers.

**SEMINARS AND TRAINING** Every day, MEP centers deal with manufacturers who share common problems and seek similar assistance. Often, manufacturers may not be aware of available resources. To help manufacturers improve their knowledge and capabilities, centers provide a variety of seminars and training programs. These seminars may address issues unique to a specific community or information sought by many firms, such as preparing for ISO 9000



certification, implementing waste reduction programs, finding and hiring employees, or profiling the newest manufacturing technologies.

In addition, MEP centers help provide manufacturing firms with exposure to other manufacturers in the area--and the opportunity to share resources and information. Regular events, including tours of local manufacturing facilities, discussions, and demonstrations of the latest industry innovations, give company owners and managers the opportunity to see state-of-the-art processes and discuss common issues with their peers.

There are a number of important lessons from the Manufacturing Extension Partnership which can illuminate the planning for similar programs being developed in other countries.

**PROGRAM OBJECTIVE.** The program must have a clear objective which makes sense to the sponsors, service providers, and participating companies. The services for them will depend upon this objective. For example, is the program intended to increase the industrialization of agrarian areas? To improve the quality of life for present manufacturing workers? To increase exports? To begin the manufacture of scarce products for home markets? To improve quality, productivity, and competitiveness to achieve larger market share?

The program must focus its resources on activities that achieve the defined objective. Performance of each element of the program should be measured against the objective and should be fine tuned. The principles of performance measurement from the U.S. program are applicable to the programs of other nations, even if the details differ markedly.

**PHASED GROWTH.** The growth pattern for the MEP was successful in allowing experimentation and innovative approaches, while at the same time assuring an orderly development of a larger program. Faster growth in the beginning bringing with it greater risk, and would probably have reduced learning significantly due to a need for caution. The use of pilot projects makes it possible to test ideas on a small scale before committing the whole system to them.

**TARGET POPULATION.** The program must know which population of companies it is to concentrate on, and it must have a very good understanding of their needs and their resources. As the program is developed, one of its requirements is continuing to improve its understanding of the target population.

**CLOSENESS TO ITS REGION.** Each individual extension centre must be carefully tuned to the needs, resources, and approaches of its region. Cookie-cutter approaches simply do not work. On the other hand, if the centre understands the other institutions in its region and works well with them, if it defines a service niche which complements rather than competes with others, if it understands that some changes in social structure within a company are complex and time-consuming, then it is easy to be successful.

**TOOL ADOPTION.** The manufacturing extension system will need tools (manufacturing benchmarking, ISO 9000 development, economic analysis, workforce training, solvent substitution, . . . ). Some can be adopted with minor adjustments from existing US based tools, and others will require more development.

**LEARNING FROM OTHERS.** The MEP borrowed freely and learned valuable lessons from manufacturing extension programs which operate at the state level. The program should take advantage of lessons learned elsewhere and earlier in the system.

MALLEABILITY. As described above, the organizations which make up the MEP have changed in structure and substance as they have learned what works best for their target populations of companies. This must be taken as a positive sign of strength, and not as a bureaucratic admission of imperfection. Continuous improvement makes it possible to serve the companies of the target population now and into the future.

According to one analyst<sup>16</sup>, "from a base of seven federally-sponsored centres in 1992, the system grew rapidly. At the end of 1994, there were MEP centres in 32 states while, by 1997, more than 70 MEP centres existed in all fifty states<sup>17</sup>. Regional and national support programs have also been sponsored in such areas as manufacturing extension staff training, methods for customer assessment and performance benchmarking, and evaluation"

The work actually done by the Manufacturing Technology Centres sheds interesting light on the problems experienced by the extensive system of US federal laboratories in coming to the aid of SMEs. The US General Accounting Office<sup>18</sup> has published a report which concluded that:

*"emphasised the transfer of advanced technologies, such as computer-integrated manufacturing systems, from the National Institute of Standards and Technology and other federal laboratories to small manufacturers. Similarly, recent legislative proposals to improve US competitiveness continue to emphasize transferring advanced manufacturing technologies from federal laboratories as the primary answer to help small manufacturers become more competitive. However, according to officials from professional and trade associations representing small manufacturers and the results of key studies on US manufacturing competitiveness, such advanced, laboratory-based technologies are not practical for most small manufacturers because these technologies generally are expensive, untested and too complex. [Emphasis added] According to those sources, the primary technology need of most small companies is to adopt such proven technologies as computer-aided design and manufacturing systems to solve routine production problems and improve productivity....."*

NIST's Manufacturing Technology Centres program is the principal federal program offering incentives for states to provide technology assistance. Since January 1989<sup>19</sup>, NIST has provided \$US 7.5 Million to each of three centres located in Cleveland, Ohio; Troy, New York; and Columbia, South Carolina. All three centres initially proposed to transfer advanced technologies from federal laboratories to small manufacturers. ***The centres found, however, that their clients primarily needed proven technologies.***[Emphasis added] During the first thirty months, the three centres initiated 1,336 projects that have emphasized proven technologies, while successfully transferring only four federal laboratory-based technologies."

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<sup>16</sup> See "Manufacturing Extension Services: Performance, Challenges, and Policy Issues" by Philip Shapiro. School of Public Policy, Georgia Institute of Technology, Atlanta GA available, in full, on the World Wide Web at <http://www.cherry.gatech.edu/mod/pubs/mespcp.htm>

<sup>17</sup> The group of MEP Centres have created a national association, "The Modernization Forum", which operates an interesting Web site at [www.modforum.org](http://www.modforum.org)

<sup>18</sup> See "Technology Transfer: Federal Efforts to Enhance the Competitiveness of Small Manufacturers" GAO Report Number GAO/RCED-92-30 of November 1991

<sup>19</sup> Note that this is from a report written in November 1991

It is important to underline that these findings report the views and needs of US SMEs; if they have difficulties in assimilating unproven technologies, how much greater are the difficulties of an SME in a developing country?

More recent work<sup>20</sup> suggests an important bias in the type of demand coming from clients. It suggests that

*"[m]ost frequently, assistance is provided in the areas of business systems and management, quality, market development, process improvement, and human resources through a combination of initial visits, engagements, assessments, and technical assistance projects. The leading categories of MEP service thus mostly emphasize "soft" technologies and techniques, only then followed by assistance with process, environmental and product technologies. Relatively fewer services are requested in "hard" areas technology, such as factory automation."*

#### SOME PRINCIPLES FOR THE DESIGN OF A NATIONAL TECHNOLOGY EXTENSION SYSTEM

Any country wishing to develop a technology extension system to link SMEs to sources of technology and technology services should give careful consideration both to the policy environment in which it plans to act and to the principles which it will use as a framework for the extension service itself.

##### Creating an appropriate policy environment

- Policy development for technology diffusion in a country needs to be complemented by appropriate policies for improving the performance of technology centres or institutes which are designed to be sources of technology development and of a wide array of technical services.
- Any policy for the enhancement of technology diffusion within an economy should pay close attention to the likely weakness of demand for technology in many firms.

Governments should consider special financing programs (such as the ADTEN Program operated by FINEP in Brazil with the help of several loans from IDB<sup>21</sup>) or tax incentive schemes such as those operated in many industrial countries. These schemes represent means through which governments may share some of the risk of technological innovation; in loan schemes, a royalty-based pay-back system can also offer to governments the possibility of sharing in some of the returns from successful innovation.

- In all countries, and especially in developing countries, governments need to pay particular attention to the need to stimulate a demand for technical change among those companies which are least motivated towards change - in many countries these are the large national companies and the traditional SMEs. Without an effective demand for its technological services, no technology centre can become independently financially viable.
- Ideally, a program for SMEs should ensure that public or private support is available to cover the five needs (finance, marketing, management, skills and technology) identified earlier in this paper;

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<sup>20</sup> See Shapiro, *op cit*

<sup>21</sup> Other such programs have been launched by FONTEC in Chile and by COLCIENCIAS in Colombia, in both instances with help from IDB.

- Any policy for technology diffusion needs to take specific steps to encourage linkages between technology centres and client firms. This could involve creation of an industrial extension service to perform a brokerage role, or provision of specific funding for linkages (which might mean a mixture of loans for firms and grants to technology centres) or the creation of 'virtual' centres in key industrial sectors to act as brokers of technology services (as is now being attempted in Colombia);

### Specific Principles

From consideration of Canada's IRAP program, and the later variations designed in Malaysia, Singapore and Thailand, one can derive a set of principles which can be used as the basis for constructing such a technology extension system.

**I A National Technology Extension System (NTES) should have clearly specified objectives** and should be designed to

- \* link enterprises to the different technology services, both public and private, which are available within the country, and, if necessary, to foreign sources as well;
- \* provide access to both 'hard' (physical) and 'soft' (management and organizational) technologies; and
- \* stimulate increased awareness in enterprises of the need to promote technical change in order to become competitive in today's global markets.

**II The client population at which the extension service is directed needs to be clearly specified**

**III The direct costs of a technology extension system should be financed on a continuing basis by the central government;**

These direct costs should be deemed to include system management costs, extension officer salaries and benefits, travel costs, and overhead costs.

This is a difficult conclusion to arrive at, since most evidence suggests that organizations which have to earn their income in competitive environments tend to operate more efficiently, and with greater attention to client needs, than do similar organizations financed by continuing governmental support. However, in no country has it been possible to create an effective service in which the costs of the brokering role played by technology extension officers have been recovered from client firms. If such initial costs are transferred to firms, few firms will make use of the service. However, the provision of any technology service identified by the extension service as being needed can be billed to the firm receiving the benefit. These comments even hold true in the US where it has been found<sup>22</sup> that "as a practical matter, it seems that even the most aggressive centres cannot cover much more than one-third of their real costs through fee revenue. Indeed, most centres have found that the unit cost of marketing and servicing small firms are high relative to the fees that can be charged, which is why the private market for consulting services to smaller firms is itself weak."

To inject into the extension system some of the feeling of 'uncertainty' which the market provides, its core

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<sup>22</sup> Shapiro, *op cit*

operations should be financed by a form of performance contract linked to regular performance evaluation.

It is also important to note that in most successful extension systems, the extension officers can offer to clients access to various financial tools to initiate or carry out technology development. In Canada, for example, the funds available for such activities are about three times the volume of the funds needed to operate the extension system. Within a technology extension system it is therefore prudent to ensure that the total value of the financing accessible, via credits or small grants, for technology development is several times larger than the cost of running the extension system.

***IV Technology extension officers should be employees of existing technically-qualified institutions***, including public and private technology centres, universities, or suitably qualified non-government organizations or even industrial associations provided that they have appropriate levels of technical capacity plus reasonable financial stability (as opposed to being direct employees of the new NTES)

What should be essential in selecting the organizations to provide extension officers should not be their institutional status; rather it should be their commitment to provide an effective service in response to client needs.

Participating organizations should be retained by the NTES via a contract which should normally be of three years duration and the contract should contain specific performance targets to be fulfilled during the life of the contract (eg numbers of firms to be contacted per industrial extension officer per year, numbers of services provided to clients) Renewal of contracts should be contingent on satisfactory performance measured against the agreed-upon targets. The condition with respect to targets is important to ensure that an assured budget does not lead to institutional complacency.

The participating organizations should provide a home-base for ITA's which offers on-going connection to technology development in the country, as a contribution to keeping the ITA up-to-date.

***V Technology extension officers should be deployed, to the extent feasible, across the principal industrial regions of the country involved.***

There is an important need to address the perceptions of inequity implicit in the geographical and institutional concentration of R&D funding and activities in any country.

One means of counteracting some of the effects of isolation felt by enterprises which are not located near appropriate technology suppliers would be to offer, via extension officers, access to some funding to defray the costs of necessary travel to consult with a technology centre. (In Canada, a scheme exists to defray the costs of travel by entrepreneurs to foreign countries in search of needed technology.) In addition, a key element of a well-functioning system is the electronic backbone to link all ITAs and participating centres for quick access to the identification of appropriate sources of assistance, wherever that assistance might be located.

***VI Technology extension officers need to have both appropriate academic qualifications (usually in a branch of engineering) and some useful level of industrial experience.***

It is difficult to overemphasise the need for extension officers to have practical experience in industry prior to being appointed to the technology extension service. Their credibility in the eyes of entrepreneurs and, hence, their capacity to give help to enterprises, must be based on a proven track-record. This principle can

be difficult to adhere to in many countries, given the scarcity of such people.

***VII There should be established a clearly written set of duties for technology extension officers.***

The primary functions of an Industrial Extension Officer should include

- \* the establishment of working contacts with enterprises within the sector and geographical area of the officer's responsibility;
- \* the establishment of close working relationships with all relevant suppliers of technology services to whom client enterprises can be referred;
- \* the performance of initial diagnoses of enterprise operations in order to identify those problem areas which adversely affect productivity and competitiveness;
- \* provision of assistance to enterprises in the identification of sources of needed technical services and in preparing suitable applications for help, where this is necessary;

***VIII All Industrial Extension officers should receive training in the management of technical change, including specific training in the techniques of company diagnosis.***

***IX The services of industrial extension officers should be provided to enterprises free of charge***

This principle is based on observation of extension systems around the world. Companies simply will not pay for the services of extension officers.

***X An initial Pilot Project for the establishment of a National Technology Extension System could be implemented within selected sectors of an economy or within a selected region.***

***XI One method of managing an overall national extension system would involve creating a national coordination group whose terms of reference should be clearly specified***

Such a group would be responsible for

- I) identifying technology-based organizations capable of providing extension services within their sectors and/or regions;
- ii) negotiating with those organizations the provision of extension officer services;
- iii) the financing of the extension service, on a continuing basis, via a new budget to be provided solely for that purpose;
- iv) monitoring the implementation of the national system by the participating institutions;
- v) strategic planning for the long-term development of the NTES, including consideration of new policy instruments to be used within the system;

- vi) devising affordable programs to assist enterprises to gain access to foreign technologies when no national source can be identified.

Such a national coordinating group should probably not directly manage any extension officers or technological services in order to avoid charges of 'conflict-of-interest'.

### **Some Preconditions to be satisfied in Palestine**

The international experience indicated above is intended to show some of the complexities of designing a national technology extension system as a backdrop for consideration of any involvement of IDRC support in this area in future.

It is the belief of this author that the preconditions for any attempt to move towards the creation of a national technology extension system in Palestine include the following:

- 1 The real commitment of the Palestine national Authority to focus on understanding the needs of existing small enterprises in the short to medium term and to work on integrating financing for such a system into the PNA Budget in the longer term;
- 2 A commitment by the PNA to implement the National Vocational Strategy which it has designed;
- 3 A commitment among major donors to work together to assist in the creation of a Palestinian Technology Extension System, operated by a Palestinian institution (which need not necessarily be in the public sector) and to provide full financing for the diagnostic and brokerage functions provided by the extension system. Furthermore, donors, either collectively or individually, should identify which services, be provided to SMEs in the context of the operations of the extension service, they would be prepared to finance or subsidize.

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## SOME OPTIONS FOR IDRC

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In deciding on its future course of action, IDRC must first decide whether it wishes to pursue activities relating to the support of SMEs in Palestine within an explicit framework designed to develop a national technology extension system or alternatively to consider support to DRC as a continuing experiment.

If IDRC chooses the first option - that of working towards the development of a Palestinian Technology Extension Service, it must engage the Ministry of Industry of the Palestinian National Authority and the Donor Community in discussions relating to the design and implementation of a Technology Extension System

If there is agreement on these issues, IDRC should be prepared to participate in the financing of the system agreed to. Since these negotiations would likely be lengthy, IDRC would then need to consider some form of bridge financing for DRC, since that body would certainly be a candidate to play some role within a national extension system. Bridge financing, if it is contemplated, should be considered under the same conditions as indicated below for support to DRC as a continuing experiment.

For DRC to continue as an experiment in bringing support to SMEs in Palestine, three preconditions would need to be fulfilled:

- 1 DRC would need to have an assured revenue stream to underwrite its continued existence;
- 2 There should be in place a flow of funding sufficiently large to finance the sector study and company diagnostic activities of the ISU; and
- 3 There should exist some source of funding to subsidize the cost of provision of services to SMEs to attack their identified problems.
- 4 More training would need to be provided to DRC staff on the use of diagnostic techniques

In practical terms, this would require

- a) that the EU provide reliable funding to the EICC of a magnitude comparable to what it provided in the past, to give DRC a continuing revenue stream to ensure its survival; and
- b) that the European Union provide, in some format, a continuing stream of support equivalent to that provided in the past by CPED for diagnostic work and activate a line of support to co-finance actual technical services for SMEs
- c) a willingness on the part of IDRC to provide financing to support diagnostic activities on a continuing basis and to provide additional training in diagnostic techniques
- d) the definition of a project with fewer and more attainable objectives and more modest expectations of private sector willingness to pay for services than was contained in the original project summary and
- e) an abandonment of the general objective of 'improv[ing] the productivity and competitiveness of SMEs in Palestine' in favour of a much more modest objective of learning how to encourage technical change in SMEs in difficult economic and political environments.



**APPENDIX I: THE INTERVIEWS**

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**DRC**

Mr Ala'edeen R. Shawa, Executive Director - preliminary discussion held by telephone, July 2

**Interviews in Ramallah**

Mr Iyad Joudeh, former Director of DRC's Ramallah Office

Mr Salah Abdel Shafi, Director of DRC's Gaza Office

Ms Rania El-Khairy, EICC Coordinator, Ramallah Office

Mr Abid Sabi, Industrial Engineer, Ramallah Office

Mr Brian A Child, Managing Director, Egerton Mercantile, Eastbourne, U.K., and part-time consultant to DRC

**Palestinian National Authority**

The Hon. Dr Sadi M El Kunz, Minister of Industry

Mr Abdul-Malek Al-Jaber, Executive Director, Palestinian Industrial Estate and Free Zone Authority

**The Private Sector**

The Federation of Palestinian Chambers of Commerce, Industry and Agriculture

Mr Amin Baidoun, Economic Affairs Directorate

Rabah Plastics Co

Mr Rajaie Rabah, Owner

Pharmacare Ltd

Mr Zudhi Kh. Sawalhi, Assistant General Manager

Sharawi Confectionary Co Ltd.

Mr Ahmad A. Sharawi, Managing Director

Masiri Biscuit and Wafer Company

Mr Masiri, Owner

**Donor Agencies**

The [European Union] Centre for Private Enterprise Development

Mr Barry O'Connell, Industrial Development Advisor.

**APPENDIX II: DOCUMENTS CONSULTED**

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9. IDRC Project Summary "Industrial Support Unit, Palestine (96-8601)
10. DRC, Project Technical Report "First Year of ISU Activity, West Bank, October 1996-October 1997"
11. DRC, Project Technical Report "Second Year of ISU Activity, West Bank, October 1997-October 1998"
12. DRC Institutional Profile, 1999
13. DRC Information Centre Bulletin, Vol 2, Issue 3, May/June 1998
14. DRC Information Centre Bulletin, Vol 2, Issue 4, July/August 1998
15. Untitled, undated and incomplete consultants' report on activities in the Packaging Sector, submitted to DRC and to the Centre for Private Enterprise Development of the European Union
16. Untitled and undated consultant's report on the furniture sector
17. Massar Associates, "Creation & Management of an Industrial Fund" a briefing note to the Minister of Industry, May 29, 1999